

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re U.S. Patent Application

Gino PALUMBO et al.

Application Number: 10/516,300

Filed: December 9, 2004

Examiner: W.T. Leader

Group Art Unit: 1795

Confirmation No.: 5590

Attny Dkt No.: BROO3001/ESS

For: PROCESS FOR ELECTROPLATING METALLIC AND METAL MATRIX  
COMPOSITE FOILS, COATINGS AND MICROCOMPONENTS

**REPLY TO EXAMINER'S ANSWER PURSUANT TO 37 C.F.R. §41.41**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

This is in reply to the Examiner's Answer of July 7, 2010.

Application Number: 10/516,300  
Attorney Docket No. BROO3001/ESS

Compliance with 37 C.F.R. 41.41 follows:

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STATEMENT OF ADDITIONAL FACTS

(1) The U.S. Patent and Trademark Office did not but could have established that Erb et al. (cited here) was also cited by the European Patent Office, German Patent Office and Canadian Intellectual Property Office and allowance proceeded in any event.

ARGUMENT

The following statements at page 4 of the Examiner's Answer are *ipse dixit*, i.e. there is no extrinsic support for them and they are scientifically incorrect, i.e. they are a wishful conclusion on the part of the U.S. Patent Office.

This would have provided agitation of the electrolyte and corresponds to step (b) recited in claim 1. Instant claim 10 recites that agitation is produced by means of pumps, stirrers or ultrasonic agitation. Thus, the stirring of Erb produces agitation in the same manner as agitation is produced in Appellant's claimed process.

So far as the last sentence in the quote is concerned, the statement is an overgeneralization. The equipment used may be the same but it is used in a different manner since the result is different.

The statement at the bottom of page 6 "Choice of an appropriate amount of agitation would have been a matter of routine optimization," does not make sense. What is ignored is that the applied prior art fails to teach what is being optimized since no such art teaches that grain refinement is related to agitation rate, agitation rate normalized for electrode area, and deposition rate.

We turn now to the portion of the Examiner's Answer beginning at page 11 which is legitimately denoted "Response to Argument."

In summary, claim 1 is directed to a tripartite relation between deposit rate, agitation rate and electrode area to produce deposit of grain size less than 100 nm (fine grain microstructure). As indicated in the application in "Description of Prior Art/Background of the Invention" such deposits are very advantageous compared to deposits of grain size greater than 100 nm (coarse grain microstructure); see Example 8 in the application as filed. The relationship of the agitation rate and electrode area is critical and is expressed in liters per minute per square centimeter of

electrode area, *i.e.* agitation rate normalized to electrode area.

The U.S. Patent Office has refused in the Examiner's Answer to accept that agitation rate normalized to electrode area (in conjunction with the deposition rate) in the specified ranges of claim 1 results in a fine-grained microstructure of the coating, *i.e.*, a grain size <100nm and does not produce the same results as the agitation of Lowenheim, Biberbach and Gonzalez which don't mention the dramatic resulting grain-refinement of the claimed process. Erb achieves this grain-refinement only by using a different way.

The Examiner's Answer at page 11 agrees that none of the prior art explicitly teaches agitation rate normalized to electrode area.

The first argument in the Examiner's Answer directed to non-explicit teaching is at page 12 of the Examiner's Answer and is that when the electrode area is one square centimeter, agitation rate and normalized agitation rate are the same. What is wrong with this firstly, is that the position is based on assumption but assumption as a basis for an unobviousness rejection is improper. See Ex parte Young, 72 U.S.P.Q. 53 (Pat. Off. Bd. App. 1946). What is wrong with this Examiner's Answer position secondly is that the normalized agitation rate is claimed in terms of liters per minute per square centimeter of electrode area and none of the prior art references cited even teaches agitation rate in terms of liters per minute. Erb measures agitation speed of the stirrer of 0-500 rpm which tells nothing about agitation since at zero rpm, there is no agitation, and Biberbach recites a motion of the article of 25 cm/sec, which again tells nothing as to the agitation rate in ml per minute. In Gonzalez, the agitation is to enable operating at a high current density and high temperatures. What the prior art shows is support for Appellant's position (as well stated in Erb's declaration) that while the prior art mixes the electrolyte, no one prior to the present application realized that in addition to removing any temperature or

concentration gradients in the electrolyte, that agitation needs to be normalized for electrode area and then only in conjunction with deposition rate of greater than 0.05 mm/h can be used as a control parameter for the microstructure obtained in the deposit.

The Examiner's Answer at page 12 takes a newly expressed position that normalized agitation rate is qualitatively the same as agitation rate normalized to electrode area. The undersigned guesses this means that agitation rate can be used as a parameter to control microstructure the same as normalized agitation rate. The basis for this seems to be that the prior art mentions pumps and stirrers. What this ignores is that the claimed invention scales the agitation provided by these to electrode area as a parameter to control microstructures and the prior art does not disclose or recognize this.

The Examiner's Answer seems to be taking a position that agitation rate normalized to electrode area is inherent in the prior art. But note that no prior art references recognize that the flow needs to be scaled to electrode area, measures this and uses this as a control parameter and that if the appropriate range is chosen in combination with the claimed deposit rate, nanocrystalline grain depositing is obtained as opposed to coarse grain depositing which is what the prior art gets (other than Erb who uses pulsing to grain refine and pays no attention to agitation as the 0 to 500 RPM indicates) (0 RPM = no agitation) and that while Erb's objective was to create nanocrystalline deposits he did not obtain such by using normalized agitation rate as a parameter.

The Examiner's Answer seems to take the position that normalized agitation rate is inherent in Lowenheim and Gonzalez because Lowenheim describes the movement of substantial quantities of solution relative to electrodes, and in his Example 2 (column 9, lines 7-8) Gonzalez describes the use of "vigorous to very vigorous agitation" and Appellant's Example



1 describes “vigorous agitation.” In reply, it is noted that this movement of substantial quantities of solution is irrelevant and Appellant’s Example 1 recitation of vigorous agitation does not exclude normalized agitation rate as claimed and that Appellant’s Examples 2-9 use normalized agitation rate plus deposition rate as claimed to obtain the fine grained microstructure as claimed. Note that Gonzalez does not obtain fine grained microstructure (it is impossible to not recognize the advantageous result of fine-grained microstructure, i.e., greatly enhanced hardness (see Erb Fig 3, going from 100VHN for Ni to 400-650VHN)). The explanation for Gonzalez not obtaining fine grained structure is that “vigorous” in Appellant’s Example 1 is different from Gonzalez’s vigorous agitation and/or that normalizing in Appellant’s Example 1 made the difference.

The Examiner’s Answer at page 13 emphasizes that the normalized agitation claimed covers five orders of magnitude, but what the prior art does not disclose or recognize is that the normalized five order of magnitude agitation rate is critical to being a control parameter in combination with the required deposit rate recited in claim 1 to obtain grain refinement.

At page 13, the Examiner’s Answer recites another implicit inherency position in arguing that all Appellant has done is recognize a new advantage as follows:

As explained above, stirring (agitation rate) expressed in liters per minute may or may not be numerically the same as normalized agitation rate expressed in liters per minute per  $\text{cm}^2$  of anode or cathode area depending on the actual area of the cathode or anode.

This is not a recognition of a new advantage of the prior art. This is because the advantage is not in the prior art result. As indicated in the present application, the advantages for Appellant’s claim 1 process are so dramatic that they could not have been missed by the prior art, if indeed grain-refinement would have been obtained as suggested in Examiner’s Answer.

If this agitation rate is inherent in all prior art references, the Examiner's Answer needs to explain why Lowenheim, Biberback and Gonzalez did not obtain nanocrystalline deposits. If the property is inherent and the range is inherent, all electroplating ever done employing stirring, according to the Examiner's Answer logic, should then result in nanocrystalline coatings – it, however, does not and Erb was the first inventor who in 1992 was able to electrodeposit nanocrystalline materials with electrodeposition! How come? This is a very critical flaw in the Examiner's Answer inherency position! If the prior art, which according to the Examiner's Answer, uses the same process and same conditions as claim 1, the prior art should have/must have obtained nanocrystalline deposits – how come they did not? How come Lowenheim did not state that his more mixing results in grain-refinement? Only Erb obtained grain refinement and he caused his grain refinement to occur by the appropriate selection of pulsing parameters and not by agitation or normalized agitation rate plus deposition rate! (see also the “Erb Declaration”). It is well recognized in the prior art that plating with electrolyte stirring does not inherently produce grain refined coatings – if it would the Erb patents would not exist.

The Examiner's Answer at page 14 says “As explained above, stirring (agitation rate) expressed in liters per minute may or may not be numerically the same as normalized agitation rate expressed in liters per min per  $\text{cm}^2$  anode or cathode area depending on the actual area of the cathode or anode.” It is pointed out this admits the unobviousness of the claimed invention. The point is that normalized agitation rate in combination with deposit rate as claimed, provides grain refinement and the prior art does not teach this.

We turn now to the treatment of the Erb declaration at pages 14 and 15 of the Examiner's Answer. The Examiner's Answer gives the conclusion in the Erb declaration (electrolyte flow must be scaled to electrode size as a parameter to control microstructure/grain size in a deposit)

no credence because no evidence is provided to support this conclusion. But Erb is qualified as an expert in the field (see paragraphs 1-5 of his declaration in the evidence section of the main brief) and he is testifying about a patent where he is the named inventor and he testifies that the stirring in his patent is a different property from and cannot be converted to agitation rate normalized to electrode rate without knowing the liters/minute provided by the stirring and the electrode areas and recitation thereof does not constitute a recognition that electrolyte flow, irrespective of electrolyte uniformity must be scaled to electrode size as a parameter for controlling microstructure grain size in an electrodeposit. The position overlooks that the case law says no evidence is necessary here, where expert testimony is relied on. See In re Fay and Fox, 146 U.S.P.Q. 47 (C.C.P.A. 1965). The position in the Examiner's Answer is *pro forma* and should be disregarded, and the Erb declaration should be given patentability determinative weight.

At page 15, the Examiner's Answer says "one of ordinary skill in the art would have been capable of optimizing agitation rate for electrodes of different areas." This ignores what is being optimized for. Note that the prior art fails to disclose that agitation rate is a parameter related to grain refinement and what is obtained in the invention is a difference in kind from what Lowenheim, Biberback and Gonzalez obtain, and Erb obtains the difference in kind in a different way.

In its main brief, Appellant has provided evidence that claims herein correspond to those obtained in the European Patent Office, German Patent Office and Canadian Intellectual Property Office. Page 15 of the Examiner's Answer disregards this evidence on the basis that it is not possible to surmise the reasons for allowance therein. The answer is that this evidence shows that the rest of the world regards normalized agitation rates (the claimed invention) are

different from agitation rates not related to electrode area (the cited prior art) and no surmising is necessary. In any event, if the U.S. Patent Office had wished it could have established that Erb et al. (cited here) was also cited by the European Patent Office, German Patent Office and Canadian Intellectual Property Office and allowance proceeded in any event. **Moreover, the position of the Examiner's Answer ignores the rationale of the patent prosecution highway** which was not available when the instant application was filed. The position in the Examiner's Answer is *pro forma* and should be disregarded. The Examiner's Answer points out that claim 1 in the EPO patent does not require normalized agitation rate; all this demonstrates is that Applicant is claiming too narrowly here.

#### Summary

The positions in the Examiner's Answer are irrational. They disregard the difference on word distinction over the prior art and rely on conjecture to make the words the same. They disregard the testimony of Professor Erb (in evidence) and what happened in three major Patent Offices (EPO, GPO, CIPO). It is submitted that the final rejection is severely defective.

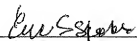
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Action To Be Taken

Reversal of the final rejection and allowance are requested.

Respectfully submitted,  
BACON & THOMAS, PLLC

**BACON & THOMAS, PLLC**  
Customer 23364  
625 Slaters Lane - 4<sup>th</sup> Floor  
Alexandria, VA 22314-1176  
Telephone: (703) 683-0500  
Facsimile: (703) 683-1080

By:   
Eric S. Spector  
Registration No. 22,495

Date: 7/22/08